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send it to the ROYAL SOCIETY, with a Figure of the Infant, with the Parts in their proper *Site*. One thing I cannot pass in Silence, *viz.* how the Circulation could be carried on, the Heart being thus inverted; and yet the Child lived several Days after Birth. I observed the Heart from its Basis, whence the *Aorta* and pulmonary Artery spring, and where the *Cava* and pulmonary Vein enter it, to its Cone, surrounded loosely with several Windings of these Vessels, through which the Blood's Circulation must necessarily be performed. A wonderful Sagacity in Nature! but I shall reserve the rest for my Tract.

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VIII. Johannes Castillioneus *D<sup>no</sup>. de Montagny, V.D. Philosoph. Prof. in Acad. Lauzannesi, Reg. Soc. Lond. Soc. &c. de Curva Cardioide, de Figura sua sic dicta.*  
S. P.

**N**ON ignoro, V. C. novarum curvarum investigationem, tanquam nimis Analystis facilem, contemni: Cum tamen D. *Carré*, non mediocris Geometra Regiæ Scientiarum Academiæ, (28 Feb. 1705.) novam curvam, quanquam *vix summa sequens fastigia rerum*, proponere non dubitârit; cur tibi, viro in amicos benignissimo, nonnulla, quæ mihi ejusdem *Carré* dissertationem legenti venerunt in mentem, scribere non ausim? Sed procæmiis omisiss, ad rem.

Semicirculi *BMA*, (Fig. 1. 2. 3. TAB. III.) diameter *BA*, ita, puncto *B* peripheriam radens, ut semper trans-

transeat per punctum  $A$  gignet curvam, de qua agitur.

Ex generatione patet,

1<sup>o</sup>. Quod  $DA\alpha$  normalis ad  $AB$ , æquat diametri duplum.

2<sup>o</sup>. Quod hujus curvæ peripheria  $ADNa\alpha NA$  finiet in  $A$ .

Curvam hanc a figura *Cardioïdem*, si placet, appellabimus.

Jam per  $a$ , &  $A$  ducantur  $aE$ ,  $AQ$  normales ad  $aA$ , & ubi libet  $EN$  normalis ad  $aE$ : Ex genesi erit  $AN = BA + AM$ , & (per similitudinem triangulorum  $QAN$ ,  $MBA$ )  $AQ = BM + MP$ , ac  $NQ = MA + AP$ .

Hæc est præcipua hujus curvæ proprietas, altera non injucunda est, quod recta  $NN$  semper æquat diametri duplum, & semper a circulo bifecatur in  $M$ .

Sit nunc  $BA = a$ ,  $aE = x$ ,  $EN = y$ , Erunt  $QN = \mp y \pm 2a$ ,  $AN = \sqrt{x^2 + y^2 - 4ay + 4a^2}$ , &  $MA = \mp a \pm \sqrt{x^2 + y^2 - 4ay + 4a^2}$ ; quæ quatuor lineæ per analogiam comparatæ, dant æquationem ad curvam.

$$y^4 - 6ay^3 + 2x^2y^2 - 6ax^2y + x^4 + 12a^2y^2 - 8a^3y + 3a^2x^2 \} = 0$$

$$\frac{2y^4 - 9ay^3 + 2x^2y^2 + 12a^2y^2 - 3ax^2y - 4ay^3}{6axy - 2xy^2 - 3a^2x - 2x^3} = \frac{\dot{x}}{\dot{y}}$$

Sed ex curvæ generatione facilior ducendæ tangentis ratio deduci potest. Veniat  $MAN$  in locum primo quamproximum  $man$ , sumantur  $AR = AM$ , &  $Ar = AN$ , & junctis  $MR$ ,  $Nr$ , ducatur per  $A$  recta

$AT$  iis parallela, & per  $Mm$ ,  $Nn$ , rectæ  $MT$ ,  $nt$ .  
 Jam  $nA : At :: nr$  (vel  $mR$ ) :  $rN :: mR \times MA :$   
 $rN \times AM :: mR \times MA : MR \times AN :: MA \times$   
 $Am : AN \times AT$ , sed in ultima ratione  $mA = MA$ ,  
 &  $TA$  normalis ad  $MN$ , quare  $nA : At ::$   
 $\overline{MA}^2 : AN \times AT$ ; si nunc ex  $M$  ducatur per circuli  
 centrum  $F$ , recta  $MF$  producenda, donec. rectæ  $TA$   
 item productæ occurrat in  $G$ , id est, usque ad circuli  
 peripheriam, erit  $\overline{MA}^2 = TA \times AG$ ; quapropter  
 $nA : At :: AG : AN$ ; describatur igitur semicir-  
 culus per  $G$ , &  $N$ , qui secabit rectam  $AT$  in  $t$ , ex  
 quo ducta recta  $tN$  erit tangens ad curvam, ad quam  
 insuper recta  $NG$  est normalis; hinc jungantur  $MO$ ,  
 cui ex  $N$  ducatur parallela, quæ tanget curvam.

Hic obiter notandum puto hanc ducendarum tan-  
 gentium methodum probe convenire pluribus curvis.

Sit  $AB$ , Fig. 2. Conchois Nicomedæ: Tunc  
 (supposita superiori præparatione)  $BP : Pt :: BR$ ,  
 (vel  $cr$ ) :  $Rb :: cr \times CP : Rb \times CP$ , (vel  $rC \times$   
 $PR$ ) :  $\overline{CP}^2 : TP \times PR$ , unde deducitur superior  
 constructio.

Recta longitudinis datæ Fig. 3.  $CPB$ , extremitate  
 $C$  radens rectam  $CDT$  ad  $DA$  normalem, semper  
 transeat per punctum  $P$  datum in ipsa  $DA$ , & ita  
 curvam  $AB$  gignat.

Superiorem præparationem, & ratiocinium huic  
 aptans habebis  $BP : Pt :: bR$  ( $rc$ ) :  $RB :: cr \times$   
 $CP : RB \times CP$  ( $BP \times rC$ ) :  $\overline{CP}^2 : BP \times PT$ ,  
 ut supra. Piget plura referre.

Cæterum methodus de *maximis*, & *minimis* dat  
 maximam ordinatam  $= \frac{9a}{4}$ , & ejus abscissam  $= \frac{a}{4}\sqrt{3}$ .  
 Posset eodem pacto investigari abscissarum maxima;  
 fed

sed *longæ ambages, series sed longa laborum*; quare sic eam quærito.

Quia  $EN$ , Fig. 1. est tangens ad curvam, recta  $MG$  ex puncto  $M$  per centrum  $F$  ducta determinat punctum  $G$ , ex quo ducta  $GN$  est normalis ad  $EN$ , ergo & ad  $Aa$ , ex hypothesi, sed  $NQ = AV = MA + AP$ ; ergo  $VP = MA$ ; atqui  $BA : AM :: MA : AP$ ; ergo  $BA : PV :: VP : PA$ ; sed  $PF = FV = a - 2z$ ; & ideo  $a : a - 2z :: a - 2z : z$ . Unde facile deducitur  $z = \frac{a}{4}$ ,  $EN = \frac{7a}{4}$ ,  $AQ = \frac{3a}{4}\sqrt{3}$ . Ubi notandum quod idem punctum  $M$ , quod præbet in recta  $NAMN$  punctum majoris ordinatæ, præbet etiam punctum majoris abscissæ.

Sed jam satis patientia tua abusus videor: quare finem faciam, nonnulla alia, quæ de hac curva commentatus sum, propediem missurus, si putes hæc & similia non indigna, quæ a te subcisivis horis legantur. Vale,

Vir, quo neque candidiorem  
Terra tulit, neque cui me sit devinctior alter.  
Viviaci, pridie Kalendas Apriles 1741.

IX. *Ad Eclipses Terræ repræsentandas, Machina J. And. Segneri, Med. Physic. & Mathem. Prof. Goetting, R. S. S.*

UT eclipsis aliqua terræ oculis exhibeatur spectanda, projectio arcuum & circulorum, qui in hemisphærio terræ illuminato concipiuntur, in planum, servire potest egregie: Sique in ejusmodi projectionem